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(54) Title: A METHOD AND APPARATUS TO BROWSE AND ACCESS DOWNLOADED CONTEXTUAL INFORMATION

(57) Abstract: A context compass method and system for accessing and browsing contextual information about a location surrounding a user equipment includes a database in a network comprising contextual information and a locating service for determining a location of the user equipment. Once the location of the user equipment is determined, the contextual information is downloaded from the database to the user equipment via a wireless connection. The contextual information comprising virtual objects in the neighboring area surrounding the user equipment is displayed relative to the location of the user equipment. One of the virtual objects may be selected by orienting the user equipment until the object to be selected is in a target space in front of the user equipment. Once an object is selected, the user can access information about the virtual object by activating the virtual object in the target space via an input device on the user equipment.

A Method and Apparatus To Browse And Access Downloaded Contextual Information

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a device and method for browsing and accessing contextual data in a user device.

2. Description of the Related Art

A device and method for presenting information related to objects being addressed is disclosed in PCT references *WO 99/42946* and *WO 99/42947*. According to these references, a system includes a database with geometric descriptions of objects. Based on where the user is and the vector corresponding to where the user is pointing, the system determines the object of interest. For example, if a user is determined to be at a specific location in a city and the user points to a hotel, the vector passes through the geometric description of the hotel in the database. Accordingly, the devices of these references merely determine what space is being addressed and imply that particular objects are being addressed by way of the association of objects to spatial definitions or geometric descriptors in the database.

A problem with these devices is that a user is required to point to a landmark or point of interest and query the system to determine what objects are retrievable in that direction. In other words, the user does not know whether an object is in the database until the user points at the object.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a method for accessing data by providing a preview of a collection of virtual objects related to the user's surroundings and allowing easy access to their contents.

According to the present invention a method for browsing and accessing context information with a user equipment comprises determining a location of the user equipment using a location service. After the location is determined, the user equipment can download the context information from a database in a network. The contextual information contains information related to actual objects within a neighborhood surrounding the user equipment. The information about each object includes name, geographical location, and URL from which content can be retrieved. The orientation of the user equipment is determined using a compass in the user equipment. Once the orientation is known, a visual user interface is generated at the user equipment for displaying the contextual information that has been downloaded in a virtual representation of the neighborhood of the user equipment. One such representation is a horizontal strip compass display onto which icons of the objects are displayed at positions corresponding to their actual relative directions. Another representation is a plan view, i.e., bird's eye view, of a map onto which object icons are superimposed. To select one of the virtual objects displayed, the user can point to one of the virtual objects in the visual user interface by orienting the user equipment. That is, the user manipulates at least a portion of the user equipment until the front of the user equipment faces the object to be selected. The

display shows a target area which is an area in front of the user equipment. A virtual object is selected by orienting the user equipment until the virtual object to be selected is within the target area. Once selected, the virtual object can be opened by actuating an activation button. The content of the selected virtual objects may be stored in the user equipment and/or immediately wirelessly downloaded from a database at the server of the wireless system or from an internet web page. retrieved from the URL associated with the one of the virtual objects. The content, or at least a portion thereof, is then visualized on the display of the user equipment.

According to the present invention, the user equipment may comprise a mobile phone, a personal digital assistant, or a wearable computer with a head-mounted display. The user equipment requires a display, an input device, a compass, and a means for wireless communication with the network in which the contextual data is stored.

Furthermore, either the network or the user equipment must have a location detector for determining the location of the user equipment so that the applicable contextual data can be downloaded.

Other objects and features of the present invention will become apparent from the following detailed description considered in conjunction with the accompanying drawings. It is to be understood, however, that the drawings are designed solely for purposes of illustration and not as a definition of the limits of the invention, for which reference should be made to the appended claims. It should be further understood that the drawings are not necessarily drawn to scale and that, unless otherwise indicated, they are merely

intended to conceptually illustrate the structures and procedures described herein.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

Fig. 1 is a schematic diagram showing the user equipment and network according to the present invention;

Fig. 2 is a signal flow diagram showing the basic method for browsing and accessing contextual data according to the present invention;

Fig. 3a and 3b show a display of a user equipment with contextual data and the user equipment;

Figs. 4a and 4b show the display and user equipment of Figs. 3a and 3b after the user equipment has been reoriented to the right;

Figs. 5a and 5b show the display when more than one virtual object are in a target area of the display;

Fig. 6 shows a display of the user equipment when the user equipment when a map and a linear compass are simultaneously displayed; and

Fig. 7 shows a view from a head mounted display of a user equipment.

DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS

Fig. 1 is a block diagram showing a system in which the present invention is incorporated. A user equipment (UE) 10 comprises a mobile device with a display 20, a speaker 25 for providing audio signals to a user, an input device 30, a CPU 40, and a compass 50 for determining the orientation of the UE 10. The UE 10 is connected via a wireless connection 70 to a network

80 comprising a database 90 and a location service 100 for determining the geographic location of the UE 10.

Although the location service 100 is shown as being in the same network as the database 90, the location service may be a separate network or may be a separate system. For example, the location service 100 may comprise a Global Positioning Satellite (GPS) system in which a locator 101 is arranged in the user equipment 10. In Blue Tooth or other short range system, the locator 100 may be in the network and tell the user its position based on the connection. Furthermore, any locating system which utilizes the Base Transceiver Stations (BTSs) of a mobile communication system such as the Time of Arrival (TOA) positioning method, or the Observed Time Difference (OTD) positioning method (These positioning methods are described in technical specification GSM 03.71, version 7.2.1) may also be used. The location system 100 may comprise a cell ID based positioning method, Angle of Arrival (AOA) (see technical specification 3G TS 25.305, version 3.1.0), or any other method which may be used to determine the location of the UE 10. The network 80 may comprise a long range network such as those used for mobile phones or a short range network such as Blue Tooth. Furthermore, the network 90 may be connected to the internet 95. The UE 10 may comprise any type of mobile computing device such as personal digital assistants (PDAs) or a mobile phone with computing abilities. Furthermore, the UE 10 may comprise a wearable computer wherein the display 20 comprises a head-mounted display which allows the user to see a virtual data while simultaneously viewing the real world.

Referring to Fig. 2, the process of browsing and accessing contextual information according to the

present invention is as follows: a location service 100 determines the geographic location of the UE, step 500. The coordinates are transmitted to the database 90 or are used in conjunction with the database 90 to download contextual data from the database 90 to the UE 10, step 510. The contextual data is a collection of virtual objects corresponding to real objects within a limited area surrounding the user's actual location. For each virtual object, the database preferably contains a record comprising at least a name of the object, a geographic location of the object in the real world, and information concerning the object. Instead of storing the information concerning the object, the database may instead or in addition include an internet address such as a Uniform Resource Locator (URL) or other remote computer address. The record may also contain a bit map for displaying an icon of the object. Furthermore, the record may also contain a type of object, i.e., a field in which a classification or category of the object is listed.

The downloaded contextual data may comprise all virtual objects in the database 90 within an area surrounding the user's location. The user may also select the size of the area of interest. For example, if the user is in a museum, the objects would include the artwork within the room in which the user is standing. The contextual data may alternatively include only those virtual objects in the database 90 which meet some criteria of the user. For example, the user may be looking for lodging for the night. Accordingly, the contextual data will include hotels, bed and breakfast inns, motels, hostels, and other places in which the user may stay for the night. In another example, the user may be looking for food and the contextual data

will include restaurants and diners in the user's current neighborhood. To accomplish this, the records of the contextual data must include information in the classification field or category field.

Instead of static objects, such as buildings, monuments, or other points of interest, the objects may comprise dynamic objects such as the UE of a friend or the location of public transportation such as a bus or train.

When downloading the contextual data, the size of the limited area surrounding the user equipment must be known. The size may comprise a default value or may be based on criteria such as the speed of the movement of the user equipment and/or the density of virtual objects in the area. Furthermore the size may be user selectable via the input device 30. For example, if a user is standing still or moving at a walking pace, the area may comprise a relatively small radius such as 50-1000 meters. However, if the user is travelling faster such as at the speed of a motor vehicle on a highway, the area may comprise a larger radius such as 10 kilometers.

Furthermore, the density of virtual objects is likely to be greater in a city. Therefore, when the user is in a city, the limited area may be smaller than when a user is in a rural or suburban area. There may be a limit as to the capacity of virtual objects the user equipment can hold or display at one time. Accordingly, the limited area may also be adjusted based on the capacity of the user equipment to hold or display the contextual data.

Once the contextual data is downloaded, the compass 50 determines the direction in which the UE 10 is pointing and displays the accessible virtual objects

that are within the limited area, step 520. The virtual object directly in front of the user is highlighted or selected and can be accessed by pushing or otherwise actuating an activation button on the input device 30. As the UE 10 changes orientation, different virtual objects move in front of the user. Therefore, to select or point to a virtual object to be accessed the user merely changes the orientation of the UE 10 until the virtual object to be accessed lies in a target space or a selection area in front of the UE 10, i.e., the user aligns the UE 10 with the virtual object to accessed, step 530. The input device 30 may then be actuated to open the selected object, i.e., retrieve the content of the selected object associated with the selected object, step 540. Finally, the content is displayed on the display, step 550.

Fig. 3a shows the display 20 when the UE 10 is a mobile phone. In this display, the orientation of the UE 10 is shown by an arrow 24. Fig. 3b shows the position of the UE 10. Here, a church is to the right of the UE 10 and a music hall and a theatre are behind the UE 10. Fig. 4a shows the display 20 and Fig. 4b shows the relative position of the UE 10 after the UE has been rotated to the right so that the church icon 22a is now in a target space 26 in front of the UE 10. Accordingly, the church icon 22a is now highlighted and can be accessed by pushing a button on the input device 30 of the mobile phone associated with that function.

Since the amount of information that can be displayed on a mobile phone display is limited, only one object is shown in one direction. However, if more than one object lies in front of the user, the user may be informed of this visually and/or aurally and a list may be displayed so that the user can choose which object in

the target space 26 is to be accessed. Fig. 5a shows the display 20 when more than one object is in front of the UE 10. A button 30d and the input device 30 associated with the list function may be actuated to show the list of selected objects. Fig. 5b shows the display 20 when the list of selected objects are shown. The input device 30 may have buttons 30a and 30b associated with up and down functions to select an item on the list. Furthermore, the button 30d or any other button on the input device 30 may function as an activation button for activating the selected virtual object when the list display is shown.

Referring to Fig. 6, when the UE 10 comprises a PDA, the display 20 shows more details. In this embodiment, the display 20 may show a map showing the virtual objects 210 surrounding the user. The top of the display 20 comprises a linear compass 200 which shows objects in a field-of-view 205 in front of the user. In Fig. 6, the field-of-view 205 of the linear compass 200 covers an angle of approximately 110 degrees. However, a larger or smaller field of view 205 could also be used depending on the particular application or the user's preference up to and including 360 degrees. In this embodiment, virtual objects 210 are shown as icons on the display at a location of the real objects they are associated with. The icons are also shown in the linear compass 200 based on the direction to them from the user equipment. Accordingly, if the field-of-view is less than 360 degrees, only those icons associated with real objects within the field of view will be displayed. As in the previous embodiment, the user selects an object by pointing the UE 10, i.e., aligning the UE 10 so that the object is in front of the UE 10. In this embodiment, an object is

selected when it is aligned within a target area 208 on the linear compass 200. The target area 208 is aligned with the front of the UE 10.

Another method for selecting one of the virtual objects may comprise using buttons which correspond to directions such as up, down, left, and right, on the input device 30 to jump from one virtual object to the next adjacent one in the input direction on the map shown on the display 20. This method eliminates the requirement of the user to reorient the UE 10 each time the user wishes to select a different virtual object.

In another embodiment shown in Fig. 7, the display comprise a head mounted display which allows the user to see virtual data while simultaneously viewing the real world. These head-mounted displays are commercially available. In this embodiment, the user views the linear compass 200 while simultaneously viewing the real world. The linear compass 200 shows the user the virtual objects within the field-of-view 205 of the compass that are accessible. In this embodiment, the user wears the display which must have mounted thereto an actual compass. Accordingly, the user selects objects by rotating his head. In Fig. 7, the user has selected the Hotel Scandic. If the user wishes to access the virtual object, the input device (not shown in Fig. 7) is actuated. Fig. 7 further shows that the linear compass 200 may show an information area 215 in which information regarding the selected virtual object is displayed such as distance of the selected virtual object from the user location, name of the selected virtual object, and the compass point of the selected virtual object.

In each of the above examples, the network has been a long range network. However, a short range network such as Blue Tooth may also be used in indoor applications. For example, instead of displaying points of interest in a city, the short range system may display other electronic devices in a room with which the UE 10 can communicate such as a telephone, a printer, or a coffee maker.

Thus, while there have shown and described and pointed out fundamental novel features of the invention as applied to a preferred embodiment thereof, it will be understood that various omissions and substitutions and changes in the form and details of the devices illustrated, and in their operation, may be made by those skilled in the art without departing from the spirit of the invention. For example, it is expressly intended that all combinations of those elements and/or method steps which perform substantially the same function in substantially the same way to achieve the same results are within the scope of the invention. Moreover, it should be recognized that structures and/or elements and/or method steps shown and/or described in connection with any disclosed form or embodiment of the invention may be incorporated in any other disclosed or described or suggested form or embodiment as a general matter of design choice. It is the intention, therefore, to be limited only as indicated by the scope of the claims appended hereto.

CLAIMS

What is claimed is:

1. A method for browsing and accessing contextual information with a user equipment, said contextual information containing virtual objects related to an area surrounding the user equipment, said method comprising:

(a) determining a location of the user equipment;

(b) downloading, at the user equipment, the contextual information containing virtual objects corresponding to real objects in a selected area surrounding the user equipment from a database accessible through a network; and

(c) generating a visual user interface at the user equipment for displaying the contextual information downloaded in said step (b).

2. The method of claim 1, further comprising the step determining an orientation of the user equipment using a compass arranged in the user equipment.

3. The method of claim 2, further comprising the steps:

(d) selecting one of the virtual objects in the visual user interface;

(e) opening the one of the virtual objects selected in said step (d) by retrieving information for the one of the virtual objects; and

(f) displaying the contextual information for the one of the virtual objects that is opened in said step (e).

4. The method of claim 1, wherein said step (b) comprises determining a size of the selected area surrounding the user equipment relative to a speed of movement of the user equipment.

5. The method of claim 1, wherein said step (b) comprises determining a size of the selected area surrounding the user equipment relative to a density of virtual objects.

6. The method of claim 1, wherein said step (b) comprises determining a size of the selected area surrounding the user equipment in response to a user selection of the size of the selected area.

7. The method of claim 1, further comprising the step of submitting criteria for contextual information to the database before said step (b) and wherein said step (b) includes downloading only selected virtual objects in the selected area surrounding the user equipment that meet the submitted criteria.

8. The method of claim 3, wherein said step (d) comprises orienting the user equipment until the one of the virtual objects is in a target space in the visual user interface of the user equipment.

9. The method of claim 8, wherein said target space corresponds to a front of the user equipment in the visual user interface.

10. The method of claim 8, wherein said step (d) comprises highlighting the one of the virtual

objects when the one of the virtual objects is in the target space.

11. The method of claim 10, wherein said step of highlighting comprises highlighting a list of objects when more than one object is in the target space.

12. The method of claim 3, wherein said step (c) comprises displaying the virtual objects on a circle surrounding a position of the user equipment.

13. The method of claim 12, wherein said step (d) comprises highlighting one of the virtual objects when the one of the virtual objects is in a target space in the visual user interface of the user equipment.

14. The method of claim 13, wherein said target space corresponds to a front of the user equipment in the visual user interface.

15. The method of claim 3, wherein said step (c) comprises displaying a linear compass in the visual user interface having a field of view and displaying the virtual objects on the linear compass at positions corresponding to their direction relative to the position of the user equipment.

16. The method of claim 15, wherein said step of displaying the linear compass comprises displaying a direction in front of the user equipment at a center of the field of view.

17. The method of claim 15, wherein the field of view is less than 360 degrees and said step of

displaying the virtual objects on the linear compass comprises displaying only the virtual objects of the contextual data within the field of view.

18. The method of claim 17, wherein said step of displaying further comprises displaying a map of the selected area surrounding the user equipment showing the geographic location of the virtual objects relative to a position of the user equipment.

19. The method of claim 18, wherein said step of displaying also comprises displaying an orientation of the user equipment on the map.

20. The method of claim 15, wherein said step of displaying comprises displaying the linear compass on a head worn display and allowing a user to simultaneously view the virtual objects and the real world.

21. The method of claim 20, wherein said step of displaying the linear compass comprises displaying a direction in front of the user equipment at a center of the field of view.

22. The method of claim 20, wherein said step of displaying the linear compass comprises displaying a field of view less than 360 degrees and displaying only the virtual objects of the contextual data within the field of view.

23. The method of claim 3, further comprising the step of displaying a distance from the user

equipment to a real object corresponding to the virtual object selected in said step (e).

24. The method of claim 3, wherein said step (e) comprises retrieving information for one of the virtual objects from the database in the network.

25. The method of claim 3, wherein said step (e) comprises retrieving information for one of the virtual objects from another database in one of the network and another computer.

26. The method of claim 3, wherein said step (e) comprises retrieving information for one of the virtual objects using a URL associated with the one of the virtual objects.

27. The method of claim 1, wherein said step (b) comprises downloading contextual information for each real object comprises downloading a name of the real object, a geographical location of the real object, and one of content related to the real object and an address pointing to content related to the real object.

28. The method of claim 27, wherein said step of downloading further comprises downloading a bitmap for each real object.

29. The method of claim 27, wherein said step of downloading further comprises downloading a field listing a category of each real object.

30. The method of claim 3, wherein said step of downloading the contextual information comprises

downloading a map including the virtual objects corresponding to real objects and said step (e) comprises using a directional input device on the user equipment to move the selection from one of the virtual objects to another in the visual user interface.

31. A context compass system for browsing and accessing contextual information, comprising:

a database accessible through a wireless network, the database comprising contextual information corresponding to real objects;

a user equipment comprising a compass, a display, an input device, a CPU, and means for wireless communication with a wireless network; and

a location service comprising means for determining a location of said user equipment,

wherein said compass is operable for determining an orientation of said user equipment, said CPU being operable for downloading contextual information containing virtual objects corresponding to real objects in a selected geographical area surrounding the location of said user equipment from the database, said CPU being operable for displaying said virtual objects on said display relative to the location of said user equipment., and said user equipment further comprising means for selecting one of the virtual objects when said user equipment is oriented so that the one of the virtual objects is within a target space in front of said user equipment and means for accessing information associated with the selected one of the virtual objects.

32. The method of claim 31, wherein said user equipment further comprises means for selecting one of

the virtual objects when said user equipment is oriented so that the one of the virtual objects is within a target space in front of said user equipment and means for accessing the contextual information associated with the selected one of the virtual objects from the database.

33. The context compass system of claim 31, wherein said user equipment comprises one of a personal digital assistant and a mobile phone.

34. The context compass system of claim 31, wherein said user equipment comprises a wearable computer and said display comprises a head-mounted display allowing simultaneous viewing of virtual objects and the real world.

35. The context compass system of claim 31, wherein said database comprises a name, a geographic location, and information for each of the virtual objects.

36. The context compass system of claim 35, wherein said database further comprises a bitmap for each of the virtual objects for displaying the object on the display.

37. The context compass system of claim 35, wherein said database further comprises a field listing a category of each of the virtual objects.

38. The context compass system of claim 35, wherein said information for each of the virtual objects comprises one of content related to the each of the

virtual objects and an address pointing to content related to the each of the virtual objects.

39. The context compass system of claim 31, wherein said CPU comprises means selecting a subgroup of virtual objects within the selected area surrounding the location of said user equipment by the category.

40. The context compass system of claim 31, wherein a size of said selected geographical area surrounding the location of said user equipment is dependent on a speed of said user equipment.

41. The context compass system of claim 31, wherein a size of said selected geographical area surrounding the location of said user equipment is dependent on a density of said virtual objects.

42. The context compass system of claim 31, wherein a size of said selected geographical area surrounding the location of said user equipment is dependent on a user selection via said input device.

43. A user equipment for browsing and accessing context information stored in a database accessible through a wireless network, comprising a compass for determining an orientation of the user equipment, a display, a CPU, and an input device, said CPU comprising means for wireless communication with the wireless network, means for downloading contextual information from the database corresponding to real objects, said contextual information including virtual objects related to real objects in a selected area surrounding a location of the user equipment, and means

for displaying the virtual objects on said display relative to a position of the user equipment.

44. The context compass system of claim 43, further comprising means for selecting a selected one of the virtual objects by orienting the user equipment so that the selected one of the virtual objects is in a target space in the display corresponding to a front of the user equipment, and means for accessing the selected one of the virtual objects by retrieving the contextual information associated with the selected one of the virtual objects and displaying the retrieved contextual information on the display in response to an actuation of said input device.

45. The user equipment of claim 43, wherein said user equipment comprises one of a personal digital assistant and a mobile phone.

46. The user equipment of claim 43, wherein said user equipment comprises a wearable computer and said display comprises a head-mounted display allowing simultaneous viewing of virtual objects and the real world.

47. The user equipment of claim 43, wherein said downloaded contextual information comprises a name, a geographic location, and one of content associated with each of the virtual objects and an address pointing to content associated with each of the virtual o objects.

48. The user equipment of claim 47, wherein said contextual information further comprises a bitmap

for each of the virtual objects for displaying the virtual object on the display.

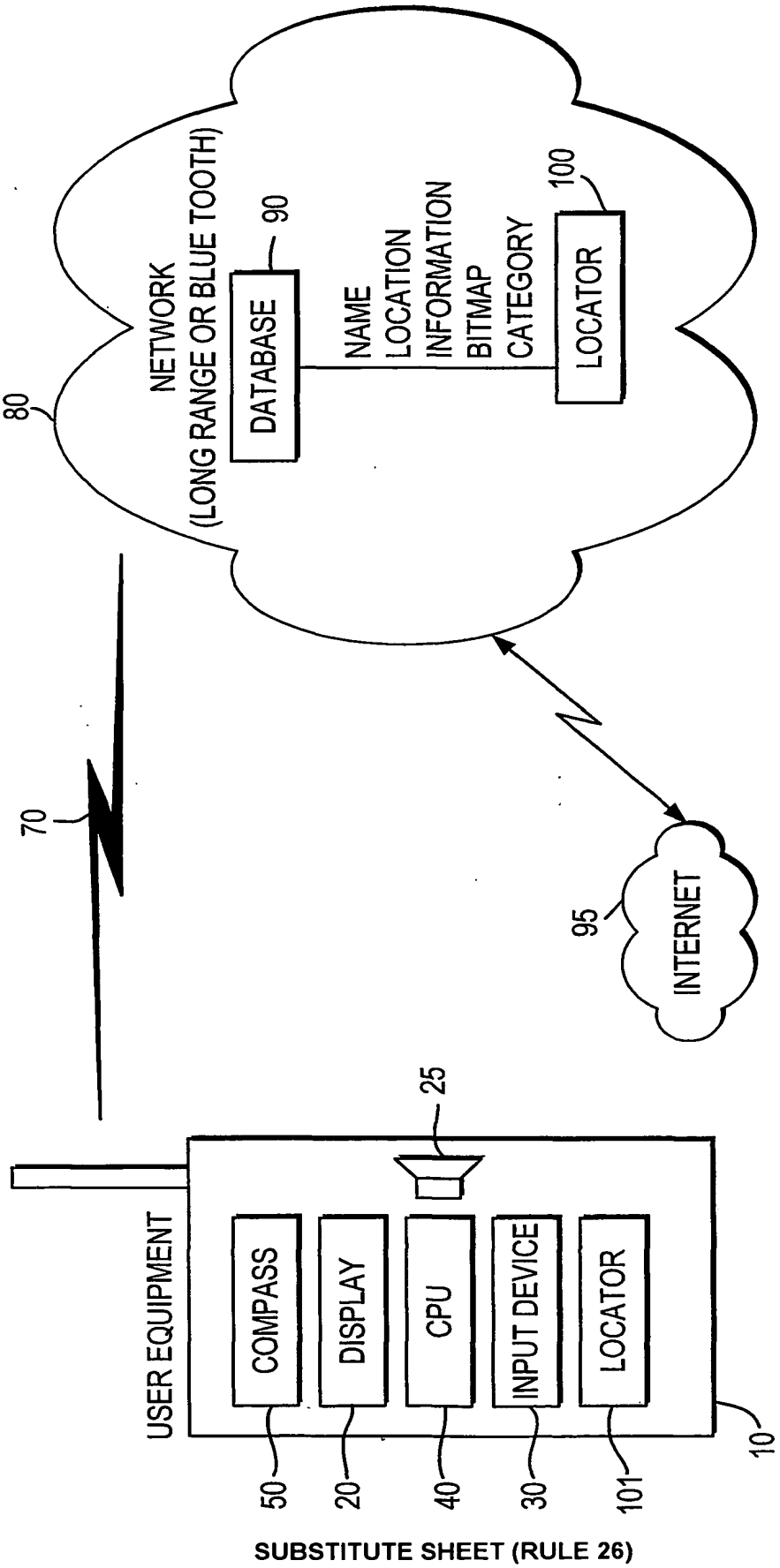
49. The user equipment of claim 47, wherein said contextual information further comprises a field listing a category of each of the virtual objects.

50. The user equipment of claim 43, wherein said CPU comprises means selecting a subgroup of virtual objects within the selected area surrounding the location of said user equipment by the category.

51. The user equipment of claim 43, wherein a size of said selected area surrounding the location of said user equipment is dependent on a speed of said user equipment.

52. The user equipment of claim 43, wherein a size of said selected area surrounding the location of said user equipment is dependent on a density of said virtual objects.

53. The user equipment of claim 43, wherein a size of said selected area surrounding the location of said user equipment is dependent on a user selection via said input device.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(LONG RANGE OR BLUE TOOTH)
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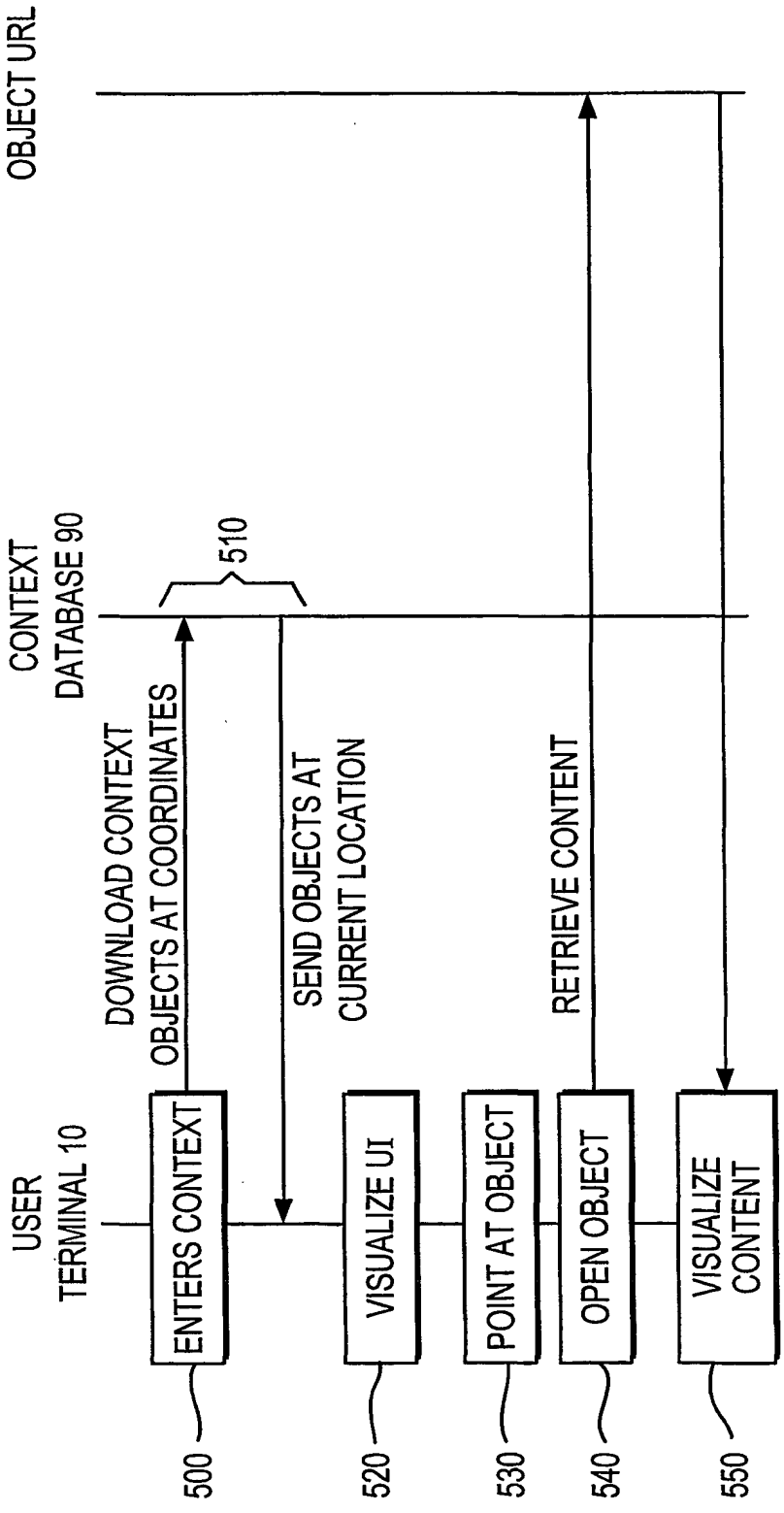
DATABASE
90
NAME
LOCATION
INFORMATION
BITMAP
CATEGORY
LOCATOR
100
70
95
INTERNET
25
USER EQUIPMENT
COMPASS
DISPLAY
CPU
INPUT DEVICE
LOCATOR
10
50
20
40
30
101

FIG. 1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510
USER TERMINAL 10
DOWNLOAD CONTEXT OBJECTS AT COORDINATES
SEND OBJECTS AT CURRENT LOCATION
RETRIEVE CONTENT
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VISUALIZE UI
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OPEN OBJECT
VISUALIZE CONTENT
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520
530
540
550

FIG. 2

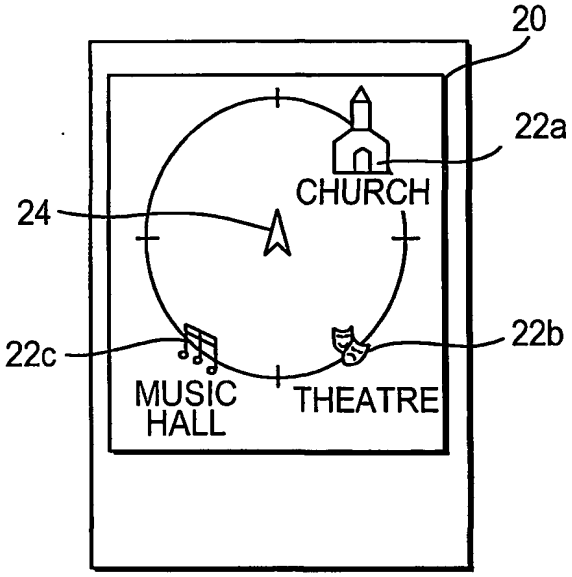

FIG. 3a

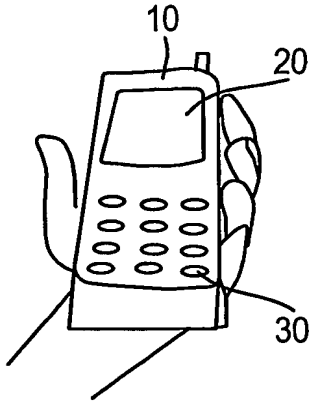

FIG. 3b

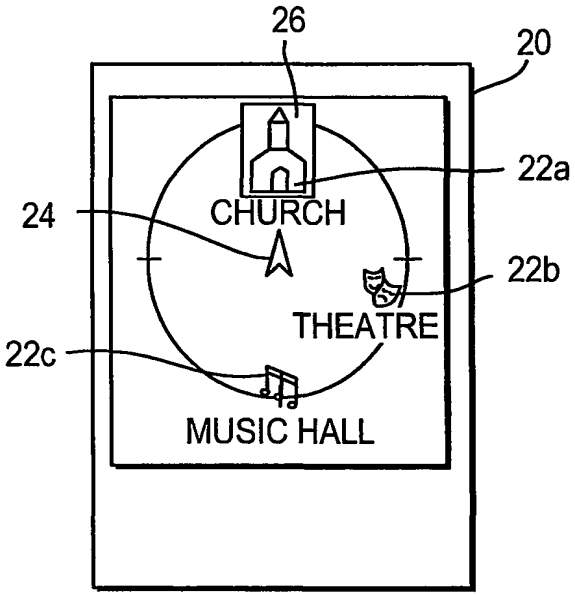

FIG. 4a

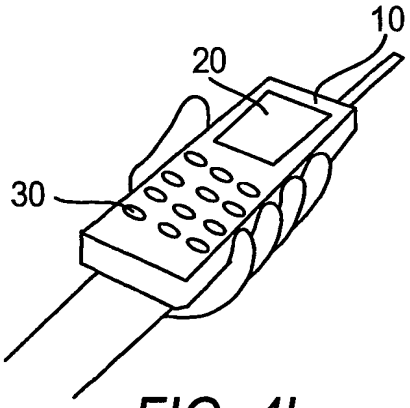

FIG. 4b

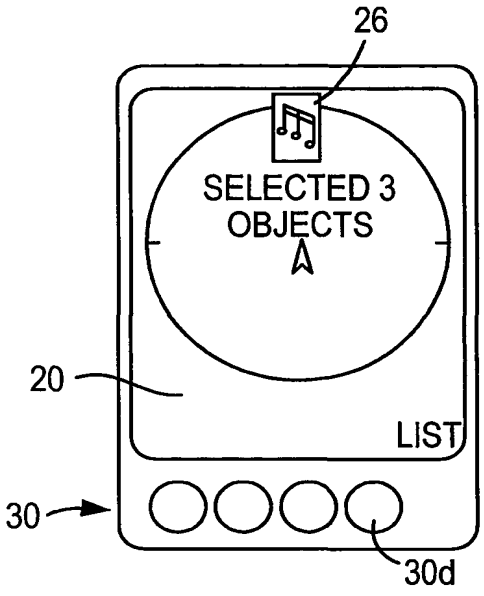
26
SELECTED 3
OBJECTS
20
LIST
30
30d

FIG. 5a

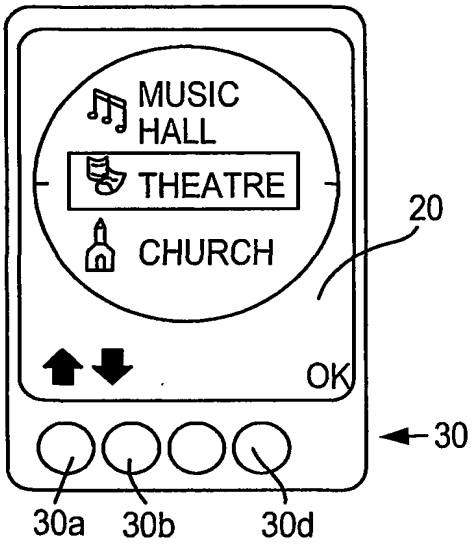
MUSIC
HALL
THEATRE
CHURCH
20
OK
30
30a
30b
30d

FIG. 5b

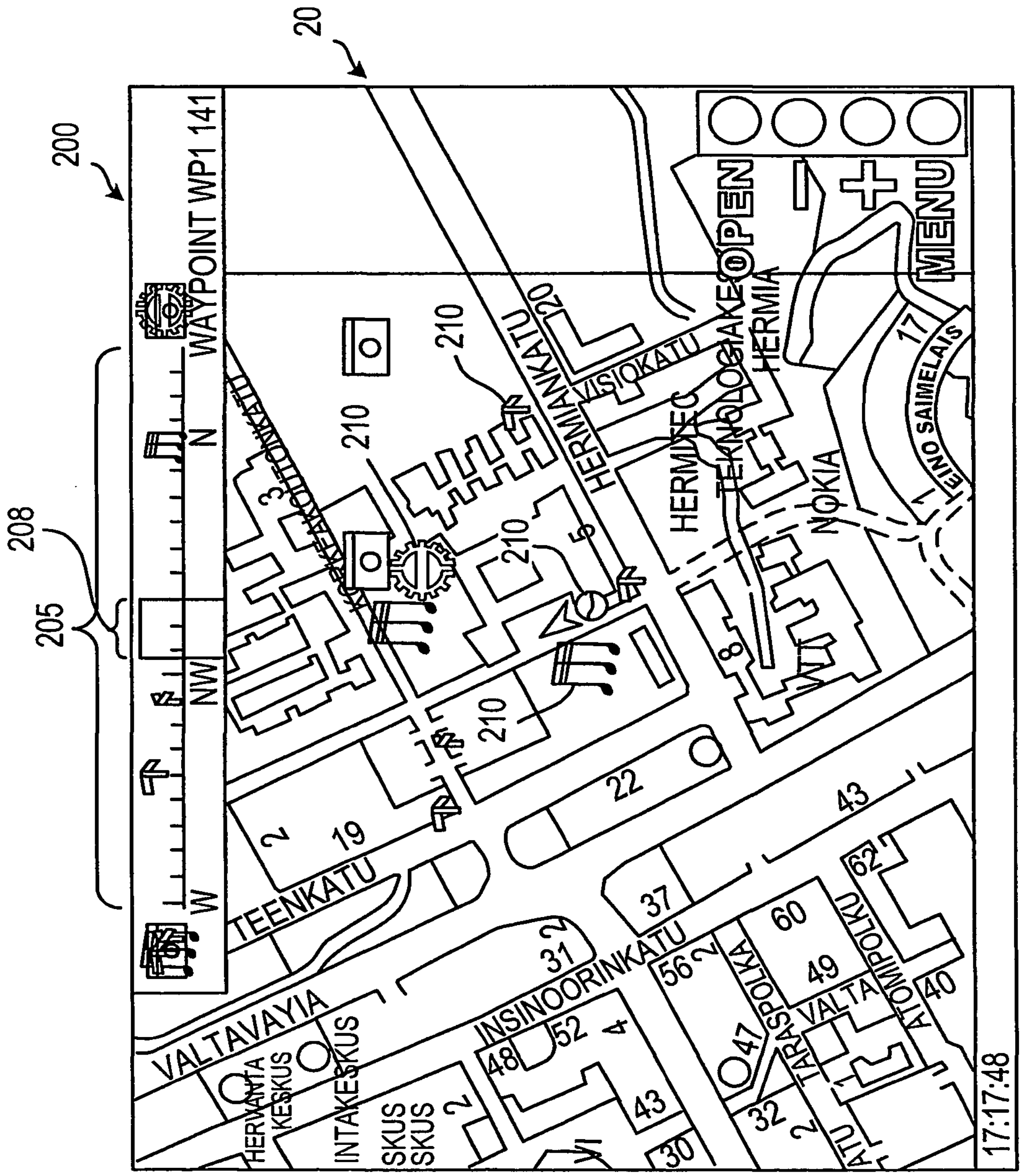
20
200
205
208
210
WAYPOINT WP1 141
W
NW
N
OPEN
MENU
HERMIANKATU
VISIOKATU
HERMIA
HERMITEC
TEKNOLOGIAKESKUS
NOKIA
EINO SAIMELAIS
VALTAVAYIA
TEENKATU
INSINOORINKATU
TARASPOLKA
ATOMIPOLKU
HERVANTA KESKUS
INTAKESKUS
VTT
17:17:48

FIG. 6

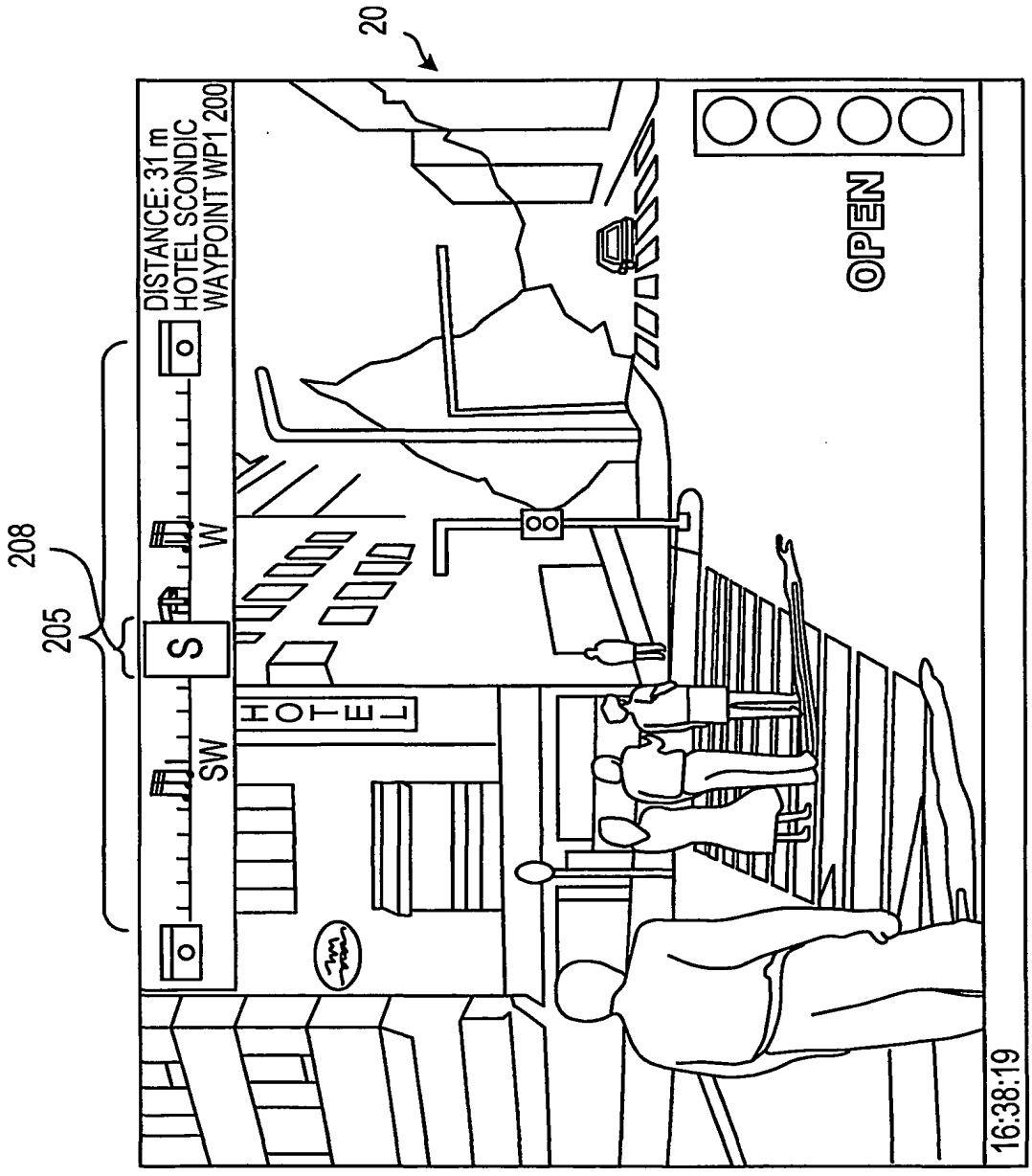
20
208
205
DISTANCE: 31 m
HOTEL SCONDIC
WAYPOINT WP1 200
W
S
SW
HOTEL
OPEN
16:38:19

FIG. 7